

## CLAIMS:

1. A method for traffic and resource control in a wireless communication device with a plurality of operation modes, the method comprising the steps of:

assembling data units of at least one incoming data stream into an output data stream, the data units destined for at least one destination node and a service level requirement attached to each of the at least one destination node;

selecting a first set of radio transmission resources for the output data stream, wherein the first set of radio transmission resources belongs to radio transmission resources available in the wireless communication device;

searching for a path that leads from the wireless communication device to one of the at least one destination node and fulfills the service level requirement corresponding to that destination node when one leg of the path is implemented by the first set of radio transmission resources, wherein the searching step is performed with respect to each of the at least one destination node;

scheduling transmission of the output data stream when the path is found for each of the at least one destination node in the searching step, wherein the transmission is scheduled to occur through the first set of radio transmission resources; and,

controlling the operation modes of the wireless communication device so that (1) an operation mode corresponding to the first set of radio transmission resources is active when the transmission is scheduled to occur and that (2) the wireless communication device is with respect to its other operation modes in a state where the service level requirement of each destination node is maintained during the transmission.

2. A method according to claim 1, further comprising a step of determining a path having the highest service level of all paths leading to a destination node, wherein the determining step is performed for the destination

node to which no path fulfilling the corresponding service level requirement is found.

3. A method according to claim 2, further comprising the steps of:  
configuring the first set of radio transmission resources;

testing whether the determined path having the highest service level fulfills the service level requirement for the at least one destination node in response to the configuring step; and

scheduling transmission of the output data stream when the determined path fulfills the service level requirement for the at least one destination node, wherein the transmission is scheduled to occur through the first set of radio transmission resources,

wherein the configuring step is performed when no path fulfilling the respective service level requirement is found for the at least one destination node in the searching step.

4. A method according to claim 1, further comprising the steps of:

choosing a second set of radio transmission resources for the output data stream;

repeating the searching step for the second set of radio transmission resources; and

scheduling transfer of the output data stream when the path is found for each of the at least one destination node in the repeating step, wherein the transmission is scheduled to occur through the second set of radio transmission resources.

5. A method according to claim 4, further comprising a step of configuring the radio transmission resources available in the wireless communication device.

6. A method according to claim 4, further comprising a step of rearranging the data units in the output data stream.

7. A method according to claim 1, wherein the searching step includes finding all paths leading from the wireless communication device to the at least one destination node.

8. A method according to claim 7, wherein the searching step comprises performing the finding step in another network element.

9. A method according to claim 1, wherein the controlling step includes changing the operation mode of the wireless communication device prior to the transmission of the at least one output data stream.

10. A method according to claim 1, wherein the selecting step comprises utilizing information about a current state of the radio transmission resources available in the wireless communication device.

11. A method according to claim 1, wherein  
the other operation modes include a plurality of operation states; and  
the controlling step includes synchronizing the plurality of operation states to maintain the service level requirement of each destination node during the transmission.

12. A system for traffic and resource control in a wireless communication device with a plurality of operation modes, the system comprising:

traffic assembly means for assembling incoming data unit streams into an output data stream, the data units destined for at least one destination node

and the output stream having a service level requirement for each of the at least one destination node;

resource selection means for selecting a first set of radio transmission resources for the output data stream, wherein the first set of radio transmission resources belongs to radio transmission resources currently available in the wireless communication device;

routing means for searching for a path that leads to one of the at least one destination node and fulfills the service level requirement corresponding to that destination node when one leg of the path is implemented by the first set of radio transmission resources, the routing means being configured to search for the path for each of the at least one destination node;

traffic scheduling means for scheduling transmission of the output data stream when the path is found for each of the at least one destination node, wherein the transmission is scheduled to occur through the first set of radio transmission resources; and

control means for controlling the operation modes of the wireless communication device so that (1) an operation mode corresponding to the first set of radio transmission resources is active when the transmission is scheduled to occur and that (2) the wireless communication device is with respect to its other operation modes in a state where the service level requirement of each destination node is maintained during the transmission.

13. A system according to claim 12, wherein the traffic assembly means, the resource selection means, the traffic scheduling means, and the control means reside in a single wireless communication device.

14. A system according to claim 12, wherein:

the other operation modes include a plurality of operation states; and

the control means are configured to synchronize the plurality of operation states to maintain the service level requirement of each destination node during the transmission.

15. A wireless communication device with a plurality of operation modes, the wireless communication device comprising:

a traffic assembly unit for assembling incoming data unit streams into at least one output data stream, the data units destined for at least one destination node and the output data stream having a service level requirement for each of the at least one destination node;

a resource selection unit for selecting a first set of radio transmission resources for the output data stream, wherein the first set of radio transmission resources belongs to radio transmission resources currently available in the wireless communication device;

path detection means, for detecting whether a path leading to a destination node and fulfilling the corresponding service level requirement is available for each of the at least one destination node, wherein one leg of the path is implemented by the first set of transmission resources;

a traffic scheduling unit, responsive to the path detection means, for scheduling transmission of the output data stream, wherein the traffic scheduling unit is configured to schedule the transmission to occur through the first set of radio transmission resources; and

control means for controlling the operation modes so that (1) an operation mode corresponding to the first set of radio transmission resources is active when the transmission is scheduled to occur and that (2) the wireless communication device is with respect to its other operation modes in a state where the service level requirement of each destination node is maintained during the transmission.

16. A wireless communication device according to claim 15, wherein the path detection means comprises an interface towards a routing entity residing outside the wireless communication device, the interface being configured to receive information about paths leading from the wireless communication device to the at least one destination node.

17. A wireless communication device according to claim 15, wherein the path detection means comprises a routing means for searching all paths leading from the wireless communication device to the destination node.

18. A wireless communication device according to claim 15, wherein the other operation modes include a plurality of operation states; and the control means are configured to synchronize the plurality of operation states to maintain the service level requirement of each destination node during the transmission.